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Studies with Avianised Strains of the Organism of Contagious Bovine Pleuro-pneumonia

A Further Examination of Growth and Modification in Embryonated Eggs

BY
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PREVIOUS articles by Sheriff & Piercy (1952, 1953) described the growth of an avianised strain (T1) of *Asterococcus bovis* in embryonated eggs and its use in the elaboration of a dried living vaccine for cattle. Favourable reports of the use of this strain as an immunising agent have been received from the East African territories (Hammond, 1953-4; Dawe, 1955; Hyslop, 1955) but not from the Sudan (Priestley, 1955).

In Kenya, 847,584 doses of avianised vaccine were issued to the field during 1952 and 1953 without untoward results and this coincided with a marked decline in the incidence of contagious bovine pleuro-pneumonia (C.B.P.P.) in areas such as Masailand and the Samburu district where the disease has long been endemic. The Tanganyika Veterinary Department's Annual Report for 1953 states: " The new avianised vaccine prepared at Kabete appears to have enabled the Department to deal a death blow to this scourge." And again, " It is recorded with very considerable satisfaction that contagious bovine pleuro-pneumonia may now be considered to have been eradicated from Tanganyika."

The encouraging results accruing from laboratory experiments and the first few large-scale field trials caused an immediate demand for large quantities of vaccine. This fact, combined with departmental staff difficulties, had the effect of sacrificing research on the altar of production and many fundamental matters of importance relating to the behaviour of the organism in the fertile egg under various conditions and the reason why certain batches of vaccine failed to pass their tests remained largely unexplained.

Whilst vaccine production has continued at the Kabete laboratory on a steady scale with encouraging results, it was thought that the most valuable contribution this institute could make would be to return to first principles and to re-examine strain T1 and other strains in fertile eggs and cattle on a comparatively fundamental basis.

This paper reports the results of a detailed examination of the potentialities of the fertile egg as a medium for the growth of strains of *A. bovis*, together with an account of a number of experiments in cattle.

Materials and Methods

Strains of A. bovis

1. *Strain T1.* The original vaccine strain of Sheriff & Piercy (1952) has now reached generation 82 during the course of routine vaccine production. For the purpose of our experiments it was considered wise to commence with a younger generation whose previous history was accurately known from the early records of one of us (S.E.P.). Accordingly, two ampoules of freeze-dried embryo, dated 4.2.52, representing the 35th passage and which had been maintained at deep-freeze temperatures for over two-and-a-half years was used for initial seed material.

2. *Strain T2.* Obtained as a primary serum-broth culture of virulent organisms isolated from one of four animals killed *in extremis* following inoculation with " lymph " from a natural outbreak of C.B.P.P. in Masailand. This particular strain, obtained through the courtesy of the Chief Veterinary Research Officer at Kabete, was described by the officers concerned as the " hottest " challenge strain used there for some years.

3. *Strain T3.* A virulent strain obtained as lung material from a natural case of C.B.P.P.

Fertile eggs

For the most part White Leghorn eggs obtained from outside sources were used. An important part of the work to be described was concerned with the

TABLE I
TITRATION OF DRIED, WHOLE-EGG VACCINE, BATCH 2

Dilutions	Route	Age of egg	No. of eggs	Deaths on days								Total	
				1	2	3	4	5	6	7	8	Deaths*	Survivors
10^{-1}	Y.S.	8	10	0	2	0	3	3	2	–	–	8/8	0
10^{-2}	,,	8	10	0	0	0	2	5	0	1	1	9/10	1
10^{-3}	,,	8	10	0	0	1	1	4	0	2	2	10/10	0
10^{-4}	,,	8	10	0	0	1	3	3	2	1	–	10/10	0
10^{-5}	,,	8	10	1	0	0	0	4	1	1	0	6/9	3
10^{-6}	,,	8	10	0	1	0	0	0	2	2	3	7/9	2
10^{-7}	,,	8	10	1	0	0	0	1	3	0	1	5/9	4
10^{-8}	,,	8	10	0	0	0	0	0	0	0	2	2/10	8
10^{-9}	,,	8	10	1	0	0	1	1	1	0	0	3/9	6
10^{-10}	,,	8	10	0	0	0	0	0	0	1	1	2/10	8

LD_{50} Titre = 7·08

* *Note.*—1st and 2nd day deaths not included in calculations. All deaths checked for organisms by dark-ground illumination.

effect of small variations of temperature of incubation. The incubators used* were specifically designed for virus research and temperatures remained steady within about half a degree centigrade. Whilst fertility rates were sometimes lower than desirable, depending on the season of the year, non-specific deaths after eight days, the age when nearly all inoculations were done, were not common.

Inoculation and harvesting techniques

The general procedure followed has already been described (Piercy, 1952). For routine passages and most titrations, 0.1 ml. of a 1/10 suspension of embryo was inoculated into the yolk sac of eight-day-old eggs which were then incubated at 35° C. Deaths on the first and second days after inoculations were considered to be due to traumatic injury and such eggs were always discarded. Material from eggs dying on the fourth or fifth day post-inoculation, to which 50 units per ml. of penicillin were commonly added, was normally used for routine transfers.

Drying and storage of strains

Infected embryos, after disintegration in mincer tubes or in an Atomix blendor, were dried in ampoules on an Edwards L.T.5 freeze-drying machine,† sealed *in vacuo* and stored at -25° C.

Cattle challenges

Challenge material consisted of a first or second generation broth culture of virulent organisms administered subcutaneously in a dose of 1.0 ml.

Cattle

The animals used were all medium-grade Zebu/European crosses aged between two and four years, obtained from European-owned farms in areas free from C.B.P.P.

Titrations in eggs

Except in growth curve experiments, eggs dying on the fifth day post-inoculation were normally used for titrations. Tenfold dilutions of inoculum were used throughout. Wherever possible 10 eggs per dilution were used to enable statistically significant interpretations to be made. Deaths occurring on the first and second days after inoculation were disregarded. All calculations were made on deaths occurring over a six-day period commencing from the third day. This period was calculated from twice the standard deviation either side of the mean in which 95 per cent. of specific deaths were expected to occur. Fifty per cent. end points were estimated by the method of Thompson (1947) and titres expressed logarithmically. Frequent use was made of dark-ground illumination to check the specificity of isolated deaths, particularly at the higher dilutions. One example of a typical titration is set out in full (Table I).

* Charles Hearson.

† W. Edwards.

Results

Vaccine strain T1

1. Viability after prolonged storage

Infected egg embryo from generation 35 was dispensed into a number of ampoules, lyophilised on 4.2.52 and maintained thereafter at deep-freeze temperatures. Two-and-a-half years later, on 16.9.54, the contents of one ampoule were reconstituted and inoculated onto the chorio-allantoic membranes of a number of eggs. Reference to Table II, which records the first few passages, shows that viable organisms were still present, causing the usual pattern of deaths. Characteristic growths were also obtained in serum-broth.

TABLE II
STRAIN T1/35, DRIED EMBRYO STORED FOR 2¼ YEARS

Generation	Inoculum	Route	Age of eggs	No. of eggs	Deaths on days						
					1	2	3	4	5	6	7
35	Reconstituted embryo	C.A.M.	8	6	1	0	0	3	2	–	–
36	Embryo	,,	8	7	3	0	0	3	1	–	–
37	,,	,,	8	13	3	3	0	5	2	–	–
38	,,	,,	8	7	1	0	2	4	–	–	–
39	,,	Y.S.	9	8	1	0	0	2	4	0	1

2. Titres in eggs

Routine passage of strain T1 continued to generation 45 when a titration of wet embryo was carried out. An LD_{50} of 5.45 was obtained. During the next 10 passages, further titrations were done from time to time. Titres showed an apparent slight increase,

possibly associated with progressive adaptation to the egg. These results illustrate the suitability of the technique used (Table III).

TABLE III

TITRES OF STRAIN T1, TESTED IN EMBRYONATED EGGS

Material	Generation	Titre (LD50)	Remarks
Wet embryo	45	5·45	
Wet embryo	46	5·00	No end point
Wet embryo	49	5·70	
Wet embryo	50	5·77	
Wet embryo	55	6·00	

Since for vaccine production and other purposes it was important to know whether the titres of different portions of the egg varied, the yolk, allantoic fluid, embryo, chorio-allantoic membrane and albumen were separately harvested and titrated. The results are recorded in Table IV.

TABLE IV

TITRATIONS OF VARIOUS PORTIONS OF EGG

Material	LD50	95 per cent. limits
Yolk	5·27	4·58–5·96
Allantoic fluid	5·40	4·45–6·35
Embryo	6·44	5·38–7·50
C.A.M.	5·27	5·38–6·08
Albumen	4·23	3·43–5·03

It is evident that whilst the richest source of organisms is the embryo, there is a fairly even distribution throughout the whole egg. Particular reference must be made at this point to the figures for albumen in view of recent work published by Priestley (1954). It will be seen from Table IV that the albumen titre was more than 1 log lower than any of the others. This is equivalent to saying that there were less than 10 per cent. of the number of organisms present in albumen compared with the rest of the egg. In fact it is unlikely that *A. bovis* invades or multiplies in the albumen at all. It is impossible to harvest albumen without some admixture of yolk and allantoic fluid, so that even if the albumen is removed 90 per cent. pure, the amount of the other fractions present would result in a titre of about the order obtained.

Priestley (1954) claimed that the emulsified contents of infertile eggs, and of embryonated eggs, failed to support the growth of *A. bovis*, and in fact were bacteriocidal even though yolk has been shown to contain a growth factor similar to that present in serum, and which is essential for the growth of the organisms in broth. He described experiments which appear to show that this bacteriocidal effect is a property of egg albumen and suggested that this might be due to the presence of lysozyme, since egg white is known to be a very rich source of this substance.

The albumen titre recorded in Table IV does not harmonise with Priestley's findings for although albumen may not support growth there is no evidence of a bacteriocidal effect. It was felt, therefore, that this point needed further investigation and accordingly the following experiments were done.

A thick streak of egg white was superimposed across the middle of a serum agar plate. After allowing the albumen to dry, three inoculations were made across the plate at right angles to the line of albumen, using a virulent culture (T3), an avianised culture (T2) and allantoic fluid from an egg infected with strain T1. Growth was obtained from all three inoculations up to and across the albumen and no inhibition was apparent.

Eighty ml. of nutrient agar was melted, cooled to about 40° C., 20 ml. of emulsified whole egg added and this medium poured on to plates. The plates were inoculated with cultures of strain T3 (virulent) and T2 (avianised). Typical colonies of *A. bovis* developed in five to six days.

Fresh egg white was added to tubes of serum broth to give final concentrations of albumen of 75, 50, 25 and 10 per cent. respectively. The tubes were each inoculated with strain T3. After six days all tubes showed excellent growth of *A. bovis*, checked by dark-ground illumination. The 75 per cent. tube was diluted in tenfold series in serum broth to a final dilution of 10^{-10}. *A. bovis* grew up to a dilution of 10^{-8}. Not only, therefore, did the albumen fail to exert a bacteriocidal effect at high concentrations, but the organism actively grew in its presence. The lysozyme activity of the egg white used was checked against *M. lysodeikticus* and at a dilution of 10^{-6}, the highest dilution used, complete lysis of a suspension of this organism occurred. When a suspension of *A. bovis* was tested in a similar manner, no lysis resulted.

Thus, our findings are at complete variance with those of Priestley.

At generation 49, a wet titration of whole egg, done on the day of harvest, resulted in an LD_{50} of 5.67. A portion of this material was freeze-dried and the remainder stored wet at ±4° C. When the dry material was reconstituted and titrated an LD_{50} of 3.39 was obtained. This was a disappointing result in that a decrease of titre of over two logs had occurred, especially when dried vaccine obtained from Kabete was found to have a titre of 4.7.

It became necessary to return to dried material at generation 39 and two passages later the above experiment was repeated with the following results:—

Generation 41, whole egg wet titre	...	6·00
Generation 41, whole egg dry titre	...	4·83

Since this was a striking improvement on the previous result, the records were examined and it was found that 50 μg of streptomycin per ml. in addition to penicillin had been included in the harvest of generation 49. The bacteriocidal effect of streptomycin on *A. bovis* was not at that time fully appreciated and may well have accounted for the unexpected loss on drying, since the ratio of streptomycin to organisms would increase during the drying process.

Subsequent work seemed to confirm this since many wet and dry titrations have now been carried out and a loss of about 1 log recorded on each occasion.

3. Storage of wet material at ±4° C.

During the course of the wet and dry titrations just described, a sample of whole egg harvest from generation 49 was set aside in the refrigerator. Two days later, as a check on technique, a repeat wet titration was done. The LD_{50} obtained was 6.56. Since this indicated nearly a 1 log rise in titre from the figure obtained (5.67) on the day of harvest, the experiment was repeated at generation 41 and a further titration also carried out after 14 days' storage at ±4° C. The results were:—

Generation 41, whole egg, wet titre on day of harvest	6·00
Generation 41, whole egg, wet titre after 2 days at 4° ±C.	7·16
Generation 41, whole egg, wet titre after 14 days at ±4° C.	6·80

There seems no doubt, therefore, that storage of wet material for a period in the refrigerator will results in higher titres than when the same material is titrated immediately. Since it is not likely that multiplication proceeds under refrigeration, the explanation appears to be that the process of near-freezing and thawing liberates a number of organisms otherwise retained in particles of material, with consequent dispersion in a more homogeneous state.

4. Growth curve in eggs

At an early stage in this work attention was paid to the rate of multiplication of the organism in eggs and the optimum time of harvest, whether for routine transfers or for vaccine production. During the period between generations 39 and 44, the mean day of death (MDD) was 4.66 with a standard deviation (SD) of 1.73 days. About 50 per cent. of deaths occurred on the fourth and fifth days, and 80 per cent. between the third and ninth days.

At generation 49, when 32 eggs were used, a similar analysis revealed the MDD to be 4.08 with a SD of 1.18 days. It appeared, therefore, that over a period of 10 passages between generations 39 and 49, no increase of virulence for the egg had occurred. Later, after it had become necessary to return to generation 39, an analysis of all deaths between generations 39 and 50, involving 228 eggs, was made resulting in a MDD of 4.43 with a SD of 1.56 days. From these results, the routine of passaging every five days using embryos harvested from fourth or fifth day deaths was adopted.

The examination was now extended to a growth curve experiment. At generation 49, embryos from eggs dying on days one to eight were separately harvested and titrated (Table V and Fig. 1).

These results harmonise with the figures already quoted for the MDD and correspond with a typical bacterial growth curve, exhibiting a lag phase (first to second day), a logarithmic phase (second to fifth day) and a stationary phase followed by a gradual decline. An important finding, from a vaccine production point of view, was the low titre obtained from embryos dead on the third day.

5. Temperature of incubation

It is well known that the growth of some organisms in embryonated eggs is largely influenced by the temperature of incubation. An outstanding example is the virus of Bluetongue in sheep, the ability of which to multiply in eggs may be significantly qualified by slight changes of temperature (Alexander, 1947). Whilst the organism of *A. bovis* is considerably more robust and easily grown in embryonated eggs than most viruses, it was felt that an examination of temperatures of incubation should nevertheless be made. Accordingly, at generation 44, 90 eggs were inoculated and divided into three lots, each of which were separately incubated at 37.7°, 35° and 32.2° C. respectively. Deaths up to the ninth day were recorded and analysed and embryos dead on the fifth day from each lot separately titrated. The results are given in Table VI.

TABLE V

GROWTH CURVE IN EGGS. STRAIN T1

Material	Day of death	LD50
Embryo	1	0·6
,,	2	0·0
,,	3	1·76
,,	4	4·7
,,	5	5·77
,,	6	6·25
,,	7	5·25
,,	8	3·81

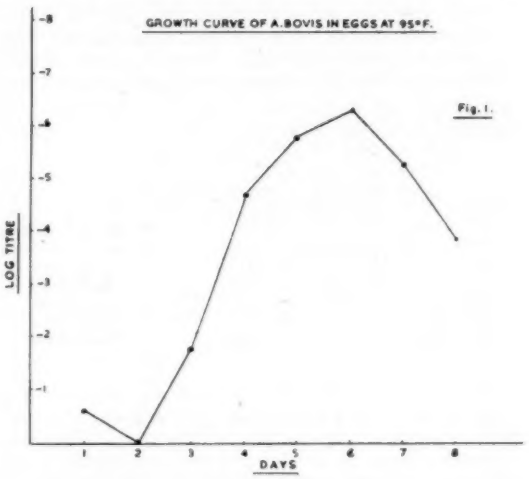

TABLE VI

THE EFFECT OF INCUBATION TEMPERATURES ON THE GROWTH OF STRAIN T1 IN EMBRYONATED EGGS

Temperature of Incubation	M.D.D.	S.D.	S.E. of M.D.D.	M.D.D. ±2 S.E.	Titre (LD50)
37·7°C.	3·46	1·08	0·23	3·00–3·92	$10^{-4.0}$
35·0°C.	3·88	1·52	0·31	3·26–4·50	$10^{-4.96}$
32·2°C.	4·95	1·38	0·26	4·44–5·46	$10^{-6.47}$

Whereas the higher temperatures of incubation concentrated the deaths within a shorter period of days and lowered the titre of harvested embryos, the lower temperature enabled the eggs to live longer

TABLE VII

STRAIN T1. CATTLE INOCULATIONS WITH DRIED WHOLE EGG

	Animal Number	Dilution of Inoculation	Inoculations With Egg Material Local reactions after : Weeks P.I. 1	2	3	4	5	Challenge Local reactions after : Weeks P.I. 1	2	3	4	5
T1/49	521	Undil.	0	0	0	0	0	10×5	5×4	0	0	0
	547	Undil.	0	0	0	0	0	10×5	5×3	3×2	0	0
	529	1/10		0	0	0	0	5×4	24×10	KIE	—	—
	562	1/10	0	0	0	0	0	12×6	7×10	3×2	2×1	0
	535	1/100	0	0	0	0	0	12×5	12×5	KIE	—	—
	526	1/100	0	0	0	0	0	12×6	12×12	8×4	0	0
	545	1/1,000	0	0	0	0	0	5×4	12×4	18×10	KIE	—
	538	1/1 000	0	0	0	0	0	8×5	12×12	KIE	—	—
T1/41	924	Undil.	0	0	0	0	0	0	0	0	0	0
	786	Undil.	0	0	0	0	0	3×½	1½×1½	0	0	0
	921	1/10	0	0	0	0	0	0	0	0	0	0
	954	1/10	0	0	0	0	0	3×4	KIE	—	—	—
	763	1/100	0	0	0	0	0	3×½	12×3	3×1	0	0
	773	1/100	0	0	0	0	0	0	0	0	0	0
	764	1/1,000	0	0	0	0	0	0	8×6	KIE	—	—
	777	1/1,000	0	0	0	0	0	0	0	0	0	0

Note.—0 means no local reaction. 10×5 means measurement in inches of local swelling. KIE means "Killed in Extremis."

and raised the titre, presumably because a greater accumulation of organisms was required to kill.

6. Cattle inoculations

At generation 49, whole eggs dying on the fifth day were emulsified and dried. Wet and dry titres in eggs resulted in figures of 5.67 and 3.39 respectively. Reference to this marked loss on drying has already been made and the view expressed that the presence of streptomycin was responsible. Cattle were inoculated with tenfold dilutions of reconstituted material (Table VII). No local reactions occurred. When challenged four out of eight animals died and the remainder recovered only after severe local reactions. The immunising value of the material was, therefore, low.

A similar trial in cattle was carried out with dried whole egg at generation 41. Wet and dry titrations gave figures of 6.00 and 4.83 respectively. Dried material was reconstituted as before and tenfold dilutions given to another group of cattle. No local reactions occurred over a period of 35 days observation. The cattle were then challenged (Table VII).

It will be seen that immunity was demonstrated in both animals receiving undiluted material, in one of two animals given the 1/10 dilution, in both animals receiving the 1/100 dilution and in one of two animals inoculated with the 1/1,000 dilution. Controls were not included since it was not thought that immunity would be engendered beyond the 1/100 dilution. That the challenge material was virulent, however, was evident from bovines 954 and 764, both of which were killed *in extremis* after typical "inoculation PP" reactions, 13 and 24 days respectively after challenge. Although the results do not form a logical pattern, it is evident that egg material in dilutions of 1/1,000 is capable of immunising cattle against needle challenge.

STRAIN T2

Growth in embryonated eggs

A second generation broth culture of this virulent strain was inoculated onto the chorio-allantoic membranes of six eggs. Embryos dying on the fifth day were harvested and organisms recovered in serum broth. Egg passages continued at four- or five-day intervals, using the embryo-yolk sac method, to generation 25 when material was dried and stored.

The distribution of deaths after eight passages, involving 64 eggs, was analysed and the MDD found to be 4.36 with a SD of 1.59 days. A further analysis using 50 eggs at generation 16 gave a figure of 4.41 with a SD of 1.75 days. An analysis of all eggs used (244) between generations 1 and 24 established a MDD of 4.48 with a SD of 1.49 days. This is strikingly similar to the figures already reported for the MDD of eggs inoculated with strain T1 from generation 39 to 50 (4.43 with a SD of 1.56 days).

Egg titrations of strain T2 were carried out on a number of occasions (Table VIII).

TABLE VIII

TITRATIONS IN EMBRYONATED EGGS OF STRAIN T2

Generation	LD50 (wet)	LD50 (dry)
6	—	1·93
10	3·0	2·27
11	4·34	Not done
12	4·45	" "
18	4·52	" "
19	4·81	" "

The overall picture indicates a gradual increase in titre consistent with increasing adaptation.

Cattle inoculations

Using reconstituted dried embryo, titrations in cattle were done at generations 6, 16 and 25, tenfold

dilutions to 1/1,000 being made in each case; two animals per dilution. After 35 days observation for local reactions, the cattle were challenged. The results of the three titrations are recorded in Table IX.

It will be seen that progressive egg passage was accompanied by a marked attenuation for cattle. Thus, at generation six, strain T2 appeared to be still fully virulent, since three out of four animals given undiluted material, or material diluted 1/10, died and the fourth animal recovered only after a severe reaction. At generation 16, however, evidence of attenuation was already obvious since there were no deaths and only one severe reaction (undiluted material). Finally, when generation 25 was used, no local reactions whatever occurred.

The challenge of these animals revealed some interesting features. The results with the T2/6 group of animals were as expected, but those following challenge of the T2/16 group are difficult to understand since the 1/10 animals were susceptible whereas the 1/100 animals were protected. We must admit the possibility here of a confusion in the numbering of cattle or the labelling of dilutions. But the results with the T2/25 group are clear cut. Dilutions of egg embryo down to 1/100 conferred solid immunity in five out of six cattle and even at 1/1,000 one of two animals was immunised. That the challenge material was virulent is established by the fate of bovines 946 and 951.

Discussion

The ability of *A. bovis* to remain viable when stored as dry material has been noted by several workers. Egg-adapted strains retain this character. Strain T1, after two and a half years storage as dried embryo at -25° C. was recovered in eggs and serum broth with no difficulty. Nor was its ability to immunise cattle affected for after six passages in eggs results as good as those obtained when the strain was first dried were obtained. In this connection it is of interest to note that Hyslop (1955) has also recorded that no appreciable change in immunising or other properties of a batch of strain T1 dried egg vaccine occurred after two and a half years storage at -25° C. This is information of considerable practical importance since to be able to concentrate a year or more's requirements of vaccine into a short period of production is usually highly convenient.

The present work confirms that the embryonated egg is an excellent medium for the growth of *A. bovis*. Whereas the variability of results using serum broth are known to all who work with this organism, a notable feature of our findings has been the ease with which results were reproduced. Titrations and growth curves have been repeated on many occasions with no more variation than must be expected within the usual statistical limits.

The growth of vaccine strain T1 in eggs has been examined from various angles but with the general object in view of raising the titre in eggs in the hope that this may increase the appropriate dilution factor when vaccinating cattle. Considerable progress has been made. Thus, the examination of the MDD and the study of the growth curve in eggs have revealed that the maximum yield of organisms when the temperature of incubation is 35° C. is obtained from eggs

TABLE IX

STRAIN T2. MODIFICATION FOR CATTLE AFTER SERIAL PASSAGES THROUGH EMBRYONATED EGGS

Egg passage	Animal number	Dilution of Inoculation	Inoculations with Egg Material — Local reactions after: Weeks P.I. 1	2	3	4	5	Challenge — Local reactions after: Weeks P.I. 1	2	3	4	5
T2/6	516	Undil.	0	5×6	KIE	—	—	—	—	—	—	—
	517	Undil.	0	4×3	18×10	KIE	—	—	—	—	—	—
	523	1/10	0	6×3	18×8	24×10	KIE	—	—	—	—	—
	520	1/10	0	0	12×6	12×8	7×8	0	0	0	0	0
	524	1/100	2×1	1×1	1×1	½×½	½×½	6×3	2×3	0	0	0
	527	1/100	4×3	4×3	4×3	2½×2	2×2	5×3	5×3	4×1	0	0
	543	1/1,000	0	0	0	0	0	8×5	12×12	KIE	—	—
	536	1/1,000	0	0	0	0	0	8×6	8×10	18×12	KIE	—
T2/16	509	Undil.	0	5×1	7×10	12×16	9×15	0	0	0	0	0
	559	Undil.	0	0	½×½	¼×¼	0	8×4	8×7	4×2	2×1	0
	542	1/10	0	0	0	0	0	10×4	10×6	KIE	—	—
	541	1/10	0	0	0	0	0	10×6	20×12	KIE	—	—
	544	1/100	0	0	0	0	0	6×3	5×3	0	0	0
	540	1/100	0	0	0	0	0	10×10	20×14	7×6	6×4	0
	539	1/1,000	0	0	0	0	0	6×4	8×10	KIE	—	—
	557	1/1,000	0	0	0	0	0	6×3	6×3	0	0	0
T2/25	949	Undil.	0	0	0	0	0	0	0	0	0	0
	950	Undil.	0	0	0	0	0	0	0	0	0	0
	948	1/10	0	0	0	0	0	0	0	0	0	0
	922	1/10	0	0	0	0	0	0	0	0	0	0
	766	1/100	0	0	0	0	0	0	0	0	0	0
	946	1/100	0	0	0	0	0	3×2	KIE	—	—	—
	951	1/1,000	0	0	0	0	0	6×4	KIE	—	—	—
	778	1/1,000	0	0	0	0	0	0	0	0	0	0

Note.—0 means no local reaction. 5×6 means measurement in inches of local swelling. KIE means "Killed in Extremis."

dying on the fourth, fifth and sixth days after inoculation. The procedure which obtains at present whereby third-day deaths (titre only 1.76) are included in the vaccine harvest can only have a diluting effect.

The titrations of individual portions of infected eggs have firmly established that the whole egg should be harvested for vaccine since good yields are obtainable from yolk, allantoic fluid, embryo, membranes and even from albumen. In this connection it is difficult to understand the statement of Priestley (1954) that albumen is bacteriocidal for *A. bovis*. Priestley's experiments were re-examined by us and no confirmation of his results could be obtained. In fact, according to our findings, albumen appears to have no specific effect on the pleuro-pneumonia organism.

Loss of titre on drying, after some poor early results probably associated with inadequate technique, conformed with experience in the virus field and was of the order of 1 log. The same loss was recorded in work to be published later (Piercy & Knight, 1956) using a Hale-Walker dry-ice vacuum machine and must be accepted as inseparable from conventional systems of drying.

The increase of titre of wet material which results after storage at $\pm 4^\circ$ C. is of considerable importance, for by this simple procedure the final egg titre of vaccine can be raised by 1 log. Further work is obviously desirable to ascertain the optimum period of storage and degree of temperature. It may well be that storage for a few hours will give the same result as for two days, or that deep-freeze conditions will prove more effective than ordinary refrigerator temperatures, or that freezing and thawing on a number of occasions may liberate a greater number of organisms.

A most important finding is that lowering the temperature of incubation to 32.2° C. results in higher titres as judged by the titration of embryos dying on the fifth day after inoculation. Since the optimum time of harvest can only be judged by studying appropriate growth curves, further growth curve experiments at an incubation temperature of 32.2° C. are planned.

No difficulty was experienced in adapting another strain (T2) to eggs. A third strain (T3), experience with which will be reported in a future article, has also been adapted. The statement of Priestley (1955) therefore, that workers in the Sudan were not always successful in growing *A. bovis* in embryonated eggs is surprising. The Sudanese workers have, on several occasions, questioned the original claim of Sheriff & Piercy (1952, 1953) that pleuro-pneumonia organisms were *adapted* to the embryonated egg and that attenuation occurred. Our experience with strain T2 appears to put the issue beyond doubt when the three titrations in cattle presented in Table IX are studied. Strain T2 was originally very virulent and after six passages in eggs it still killed cattle or caused extensive local reactions when given as undiluted material or when diluted 1/10. But by the 25th passage no local reactions whatever were observed and the majority of the animals were immunised, proving that the egg material was fully viable. Clearly, therefore, rapid attenuation had occurred and if this was so it seems to us quite proper to use such terms as "adaptation," "modification" and "attenuation."

Whether strain T2 will prove to be a useful alternative to strain T1 as an immunising agent remains to be seen but it is of some significance that at the 25th passage animals were immunised at dilutions of 1/10, 1/100 and in one case 1/1,000.

Early attempts to relate the findings with strain T1 in eggs to the immunisation of cattle were not entirely satisfactory. The severe loss of titre that occurred when generation T1/49 was dried, for which an explanation has been offered, probably accounted for the poor results in cattle. The experiment with higher titre material at generation T1/41 was more successful and although the results were irregular, animals were immunised at dilutions down to 1/1,000. Further work on vaccine production and steps taken to ensure the manufacture of high titre material form the subject of a later communication.

Summary and Conclusions

1. An avianised strain (T1) of *A. bovis* stored as dried embryo at -25° C. for two and a half years, was still fully viable when tested in eggs and cattle.

2. The embryonated egg proved extremely satisfactory as a medium for the study of three strains of *A. bovis*.

3. The titre of avianised strains of *A. bovis* was considerably increased by harvesting eggs dying during the peak period of the growth curve, by storing wet material at $\pm 4^\circ$ C. for two days, and by lowering the temperature of incubation from 35° to 32.2° C.

4. Organisms to a high titre were demonstrated in embryo, yolk, allantoic fluid and chorio-allantoic membrane.

5. No evidence that albumen is bacteriocidal to *A. bovis* was obtained.

6. A virulent strain (T2) of *A. bovis*, after 25 passages through embryonated eggs, caused no local reactions when returned to cattle and stimulated immunity at dilutions of 1/100 and 1/1,000 against "needle" challenge.

7. There seems no longer any reason to doubt that the passage of some strains of *A. bovis* through embryonated eggs is accompanied by modification and attenuation for cattle.

Acknowledgment.—This paper is published by kind permission of the Director of the East African Veterinary Research Organisation.

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Caesarean Operation in Camels

BY
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TO the best of my knowledge there is no record of a caesarean operation performed on a camel. I hope that the two cases following, together with their post-operative treatment and history, will be of interest.

Case No. 1

A three-year-old heifer camel was brought to the Nicosia Veterinary Hospital with the history of being in labour for two days but showing no signs of calving. No membranes or fluid discharges were observed.

The animal was examined and a complete left-hand torsion of the uterus was diagnosed. Because of the rather distressed condition of the animal and the impossibility of correction by other means a caesarean section was performed.

Technique

Restraint.—The camel was made to lie on its right side, and when recumbent the fore and hind legs were secured separately by ropes. After the induction of general anaesthesia the left hind leg was released, secured by a noose placed above the fetlock, and then drawn well backwards. The other hind leg was secured to the forelegs.

Anaesthesia.—Anaesthesia was induced by the slow intravenous injection of chloral hydrate. The induction took 10 minutes, and in later stages the depth of narcosis was assessed by the relaxation of the tail and the absence of response to pricking the skin with a needle. The dose required to induce deep narcosis was 2½ oz.

The chloral hydrate was prepared as a 10 per cent. solution in normal saline. The injection was made by slow gravitation using a 12-gauge 2½-inch needle. Induction of anaesthesia was quiet, and there was no need for any additional anaesthetic though the operation took nearly two hours.

Preparation of site.—The lower left flank was selected as the most suitable site for the operation. An area of 20 inches square, extending from the midline to the point of the extended stifle joint, was shaved. This area, the udder, and the greater part of the surrounding area were thoroughly washed with soap and hot water and rinsed. The operation site was treated with 90 per cent. alcohol and then with tincture of iodine. The region of the incision was surrounded by sterilised towels held in position by clips.

Instruments.—No special instruments were required. The inclusion of two retractors was very useful in keeping the incision lips well opened. For suturing the uterus and peritoneum No. 2 20-day chromic catgut was used, and for the skin No. 8 nylon and ordinary ¼-inch-wide cotton tape was used. Suture needles employed were: for internal suturing, full curved 2½ inches long, and for the skin, half curved 4 inches long (both having triangular cutting edges).

Assistance.—Three persons formed the surgical team: the operator; the first assistant who carried out swabbing, clipping of sutures, holding the uterus adjacent to the abdominal wall during incision, withdrawal of the calf and subsequent suturing, and the second assistant who handed the instruments, maintained ready supply of ligature and suture material, and assisted in the delivery of the calf.

In addition to the surgical team there were two men holding the ropes and a few others to assist if required.

Modus operandi.—The abdominal wall was opened by an oblique incision commencing at a point 15 inches from the pedestal pad and extending 12 inches to a point in front of the extended stifle.

The muscle fibres involved were those of the internal and external obliques, which were very thick and vascular especially at the upper part of the incision. The biggest veins encountered were ligatured with No. 0 20-day chromic catgut. On cutting through the peritoneum a layer of fat 2 inches thick was met, closely attached to the parietal surface of the peritoneum. A small incision was first made and the retractors were introduced. The opening was then enlarged with straight blunt-pointed scissors. Immediately beneath the incision the uterus was found. The hand was then inserted into the abdomen and the outline of the foetus within the uterus was detected. The second hand was then introduced and the lower portion of the uterus with the parts of the foetus within were gripped and lifted upwards towards the abdominal opening. It was then passed to the first assistant.

The exposed portion of the uterus was next surrounded with sterilised gauze, and an incision was made over the protruding hock of the calf. The incision was further continued with straight scissors to a length of 10 inches. This length was later found to be insufficient, and some tearing of the uterine wall followed when the thoracic region of the calf was passing through the opening.

The hand was introduced through the opening, and the left hind leg was drawn from the incision. Calving snares were applied. The second digit was then similarly dealt with. With both hind legs well secured, traction was applied in the upward and backward direction.

During extraction great care was taken to maintain the grip on the uterus. The calf having been delivered, the foetal membranes, which were of the diffuse type and resembled those of a mare, were removed by applying a snare to the lacerated edges of the allantoic chorion and applying gentle traction

Sites of incision. *Left:* Oblique incision used in Case 1. *Above:* Parallel incision for Case 2.

and torsion. Two pessaries* were introduced into the uterus, and the incision was closed by means of a continuous Lembert suture. A further row of interrupted Lembert sutures were applied to ensure better sealing.

Intramammary penicillin (100,000 units) was smeared on the sutured incision before and after the sealing sutures. The position of the uterus was then corrected by gradual manipulation in the abdomen and through the vagina. Traction was applied clockwise while the assistant kept his hand in the vagina. The abdominal wall was sealed in three stages, as follows:—

First stage.—Peritoneum—continuous suture using No. 2 20-day chromic catgut.

Second stage.—Muscular portion—continuous suture using No. 2 20-day chromic catgut.

Third stage.—Skin. The skin was closed by a series of interrupted nylon mattress sutures about 1½ inches apart and ½ inch from the cut edge. These were supported by four tape mattress sutures evenly spaced along the incision.

Sulphanilimide powder and intramammary penicillin were applied after every stage of suturing. The skin was dressed with sulphanilimide and the wound covered with a fine layer of cotton wool.

The animal recovered conciousness 15 minutes after the conclusion of the operation. It was raised to a sitting position and supported with several sacks of straw.

Treatment and History

First day

Symptoms.—Temperature 97° F., rigors, no appetite, inability to rise.

Treatment.—3,000,000 units procaine penicillin intramuscularly, 12 c.c. camphorin oil (3 gr. per c.c.), 1,000 c.c. glucose saline solution intravenously. The animal was covered with several blankets and kept warm all night, the room being heated with an oil stove.

Second day

Temperature 102° F. Animal unable to rise. No appetite, no bowel movements though urinating frequently.

* "Compron" pessaries.

Delivery of the calf.

Treatment.—1,000 c.c. glucose saline intravenously; 1,000,000 units procaine penicillin; 12 c.c. camphorin oil; two pints of liquid paraffin orally; enema.

Third day

Temperature 106° F. No appetite, inability to rise. No bowel movements.

Treatment.—100 c.c. 33½ per cent. sulphadimidine; 1,000 c.c. glucose saline intravenously; two pints of liquid paraffin; 1,000,000 units procaine penicillin; enema.

Fourth day

Temperature 102° F. Animal stood, picked some food, and passed faeces.

Treatment.—Sulphadimidine was repeated.

Fifth day

Temperature 101° F. Animal began feeding and ruminating; bowel movements regular; animal moved about freely. Sulphadimidine was repeated.

Sixth day

An inflammatory swelling appeared at the site of operation with thick purulent discharge. Two of the tape sutures, as well as three of the nylon sutures, had cut through the skin.

The sutures were replaced, but cut the skin again in four days. The remaining sutures were then removed, and the incision was treated as an open wound with daily washings with warm water, the

Removal of the placenta.

application of propamidine cream, and later of acriflavine emulsion. The camel was released from hospital after a month. It is of interest to note that, at the time of writing, six months after the operation, the camel is thriving and is in calf again. It remains to be seen whether she will calf naturally or need surgical intervention.

Case 2

A six-year-old camel with right-hand torsion of the uterus. The same procedure was followed as in Case 1 with the following deviations.

Anaesthesia

A bigger dose of chloral hydrate (3½ oz.) was needed to induce narcosis. The solution was administered while the animal was in the sitting position. Induction was again very quiet.

Site.—This time the incision was made parallel, and some 4 inches dorsal to, the mammary vein.

The skin was sealed by single interrupted sutures instead of mattress sutures.

During the period of operation glucose saline solution was continuously administered by the drip method.

The same post-operative treatment was followed.

It is interesting to note that this animal recovered much more quickly. It started to feed on the evening of the operation, and was able to rise and move about the next morning. The temperature never rose above 102° F. and there was no bowel stasis.

The sutures were removed in 10 days without any complication, and the animal was released after 15 days in hospital.

Summary

Two cases of caesarean section in camels, together with post-operative symptoms and treatment are reported. The indication in both cases was torsion of the uterus.

Acknowledgment.—I should like to express my thanks to Mr. R. M. S. Neave, M.C., M.R.C.V.S., Chief Veterinary Officer, Cyprus, for his encouragement, and for his assistance during the operation. To Mr. R. W. Crowther, B.SC., M.R.C.V.S., for his help in preparing this report, and to the staff of the Nicosia Veterinary Hospital for the interest they showed and the care they took of these animals during their period in hospital.

An Antidote in Suspected Warfarin Poisoning in the Cat

BY

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Subject

A female cat, the pet of a health centre attached to a large flour mill.

Symptoms

Collapse and lethargy with complete inappetence. The cat was unable to stand even when assisted. The mucous membranes were pallid, and the temperature was 101° F. There was no apparent pain, nor resentment on palpation of body and limbs. On the second day increased heart rate (approximately 180 per minute) was recorded.

A grave prognosis was given.

Diagnosis

At first it was thought that the cat must have suffered some injury, but a definite diagnosis was not then made. The next day a tentative diagnosis of warfarin poisoning was made, but it was not until the fourth day that it was ascertained that warfarin had been used in a part of the mill frequented by the cat.

Treatment

McGirr & Papworth (1955) state that "The antidote for warfarin poisoning is massive doses of vitamin K by oral administration," but in the circumstances it was decided to try injections of parenteral blood coagulant*. Treatment may be epitomised as follows:—

1st day.—Warmth. Glucose and milk by dropper.

2nd day.—Parenteral blood coagulant, 1 ml. by the intramuscular route.

3rd day.—Parenteral blood coagulant, 1 ml., together with 100 microgrammes vitamin B_{12}†, 1 ml. by intramuscular injection.

4th day.—Parenteral blood coagulant together with vitamin B_{12}, as on the previous day.

5th day.—Vitamin B_{12} alone, 1 ml.

Results

Improvement was seen on the third day. The heart rate returned to normal (around 120 per minute) and the cat resented the injections. On the fourth day the cat was voluntarily taking a little food and restraint was needed when making the injections. Visible mucous membranes had lost their pale appearance.

When finally seen on the fifth day the cat appeared normal.

It is considered that the patient nursing and care given by the staff of the health centre contributed in no small way to the cat's recovery. It must be emphasised that the diagnosis of warfarin poisoning was circumstantial only.

Reference

McGIRR, J. L., & PAPWORTH, D. S. (1955). *Vet. Rec.* **67**. 124.

* Venagmin—Willows Francis, Ltd.

† Cytamen "100"—Glaxo.

Control of a Kennel Outbreak of Distemper

BY
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ALTHOUGH it is theoretically possible to eradicate distemper/hard pad disease from dogs by the use of the newer vaccines and our improved knowledge of the epidemiology of the disease, practical considerations indicate that as long as we have dogs the problems associated with the distemper complex will remain. One of the most serious aspects of this problem is the prevention and control of the disease if it is introduced into a closely confined dog community, such as breeding, boarding or quarantine kennels. The control of a new intake can only be assessed on clinical grounds, as it is not a practical possibility to determine the immune status either of the new arrivals or of the present stock with an unknown background.

This communication describes an outbreak of distemper/hard pad infection in a kennel, and the measures employed to control it.

The first suspicions were aroused on June 2nd, 1955, when a Dachshund bitch aged six years was found to be off food and with slight catarrhal symptoms. On June 3rd a cross-bred Boxer puppy aged four months was found to be similarly affected; on the following day an inspection was made of all dogs in the kennels and temperatures taken. This inspection revealed two more cases which showed a temperature rise only, a two-year-old Boxer, and a one-year-old Sidney Silkie.

These four were removed from their kennels and isolated on the morning of June 4th. Although the isolation block had a separate entrance and was supplied with its own kennel coats, rubber boots, feeding bowls and disinfectant tray for feet, and was managed by a separate kennelmaid, the isolation was by no means good; the block was under the same roof, and in the same building, as many normally occupied kennels. It was decided, therefore, to inject all dogs having no certain history of previous inoculation with canine distemper vaccine.

Thirty-two dogs were injected with egg-adapted canine distemper virus vaccine* on June 9th and 10th. A further 11, which were admitted to the kennels during the next six weeks, were also inoculated.

Of the four dogs originally affected, the Dachshund, which was previously suffering from paraplegia, died on June 8th; the Sidney Silkie developed hemiplegia and chorea and was destroyed at the request of the owner on July 9th. The remaining two recovered, and were cleared from the isolation block five weeks after the onset.

It is felt that these results are worth recording because it is difficult to get an assessment of the value of a new vaccine by application to a random animal population, not knowing the actual number coming into contact with the disease. It appeared that the use of this new distemper vaccine, in the presence of the disease, would afford an opportunity to form some sort of estimate of the immunity produced. From previous experience of dogs housed in such numbers, and in such close proximity, one would have expected considerable spread of the original infection. In spite of the imperfect isolation, and the admission of new dogs throughout the period, no further cases occurred.

Following the outbreak this vaccine has been used for the routine vaccination of well over 100 susceptible puppies, and to date there has been neither reaction to the vaccine nor an apparent breakdown in immunity.

Acknowledgment.—I should like to thank Messrs. N. V. Philips-Roxane for offering to supply the vaccine when I was in Holland last year, and Messrs. Allen & Hanburys Ltd., who arranged the prompt importation at short notice.

* The vaccine used in this outbreak has only recently been available in this country; the application of freeze drying and vacuum sealing techniques to the preparation of this product are said to ensure reliability and a long storage life.

Canine Distemper Vaccine, Egg-adapted (Living); N. V. Philips-Roxane, Holland; distributed in Great Britain and Northern Ireland by Allen & Hanburys, Ltd., London.

TREATING KIWIS FOR BROKEN LEGS

Although the national emblem of New Zealand, the Kiwi is rapidly dying out in its home country, and the zoos are doing as much as they can to keep as many as possible alive. In the natural state these birds are often involved in accidents resulting in a broken leg, and various methods have been devised to treat the condition. Of 30 birds treated recently in New Zealand, 28 were splinted in the usual way but did not survive. In the two remaining cases a gypsona plaster cast was applied and both birds recovered.

COMBATING LOCUSTS IN SAUDI ARABIA

Three F.A.O. aircraft have arrived at Jeddah to join the international campaign against the desert locust in its Saudi Arabian breeding grounds. Auster monoplanes, which have been used for spotting and attacking locust swarms in eastern Africa since 1953, will be the first aircraft to be used against locusts in Saudi Arabia. The decision to move the monoplanes from Africa to the Arabian Peninsula was recommended in 1955 by the participating governments in F.A.O., and all expenses are to be paid by the Organisation.

Problems of Grassland and Forage Farming

The following is a summary of an article by Mr. G. N. Gould which was published in The Farmer & Stock-breeder, *and appears by courtesy of the Editor of that journal.*

THE achievements of war and post-war agriculture, in particular those relating to grassland improvement, are too well known to need reiteration, but it is important to realise that the record milk production during that period was achieved despite a 75 per cent. reduction in imported feeding-stuffs. On many farms the grass season has increased from a pre-war average of about 15 weeks to a present-day 30 weeks or more. It was natural that mistakes and miscalculations would occur from the speed and the wide application of new methods in emergency; and it would probably be true to say that our ability to grow grass and forage crops has always been ahead of our ability to feed or conserve to the best advantage.

With the initiation of the programme of grassland improvement, the veterinary profession was soon confronted with a variety of associated problems, some of which at least it had been assured would not happen. Thus, it had been thought that the ploughing up of old pastures would eliminate stomach and husk worm.

Husk is to-day a major hazard, frequently affecting the whole herd and arising over a much longer period in the year than before the war—when it was essentually a problem of heifers on autumn grazing—and it illustrates the importance of management. More productive pastures of greater recuperative capacity, and with leafier grasses and clovers, produce a more favourable habitat for the larval stage of the parasite, and in consequence a greater chance of survival. The better pastures are not only subjected to a heavier rate of stocking, but the cattle are returned to them more frequently than before the war, and this leads to an increased risk of heavier infection. In a wet season of persistent grass growth this is accentuated, and in addition humidity favours the survival of the larvae. The continued presence of the herd on this pasture enables the life cycle of the parasite to continue without interruption, and mass infestation can be built up.

The principles of grazing management necessary to minimise the risk of such problems would appear to include periodic rest of pastures for a sufficient period to allow reduction in the larval content from weathering. The period of rest required will vary with the prevailing weather conditions and the state of growth of the pasture. Desiccation produced by dry weather and hard grazing favours reduction of the larvae, whereas the persistence of leafy growth, which provides shade and a higher humidity, encourages their survival.

The influence of changes in the methods of grazing is demonstrated also by the vast increase in husk recorded initially in strip grazed herds, until the lesson of the disastrous effect of " run back " in work problems of sheep was recalled, and the provision of a back fence—to restrict run back to not more than seven days—was instituted. Strip grazing gives a great increase in production per acre. This can be an effective means of grazing a potentially dangerous bloat pasture, by forcing the stock to eat leaf and stem at the same time, and is a valuable practice subject to common-sense safeguards.

The old story of the build-up of parasitic infection in the home paddock kept for calves and heifers is well known, and emphasises the potential danger of build-up of worm infection in cattle kept for long periods on the same pasture. It is a warning also of the danger of " holding " pastures, or run backs to pasture, so frequently advised in the grazing of leys and forage crops. Such pastures are a high risk in respect of Johne's disease, not only at the time of use as a holding pasture but for a prolonged period of grazing subsequently. Johne's is a disease of vast economic importance and the cause of great loss of production and life in many herds.

Hypomagnesaemia

The close association between heavy, nitrogenous fertilisers on grazing land shortly prior to grazing, and the occurrence of hypomagnesaemia is now recognised. Such practices are associated also with lush leafy growth, with a consequent tendency to grass scours, and an initial loss of bodily condition. The wide dispersal of loose faeces favours parasitic survival as well as waste of food high in protein. Increased tendency to hypomagnesaemia was also recorded when the feeding of fodder beet was more common. When fed to excess, severe scours and hypomagnesaemia were common sequels of the feeding of what was undoubtedly a very valuable root crop —if properly fed.

There appears to be a close connection between the occurrence of hypomagnesaemia and milk fever at calving, and the subsequent development of ketosis. How much milk is lost because of sub-clinical ketosis? How much ketosis is caused by feeding management?

Hypomagnesaemia is a problem that has occasioned many sudden deaths in both beef and dairy cattle; it occurs also as a less dramatic condition causing considerable loss of production. It tends to have seasonal incidence, being most frequently observed in the early part of the grass season, but in recent years it has tended to occur at other periods of the year—in association with a flush of grass, the grazing of green forage crops, or excessive feeding of roots.

Whatever may be the trigger mechanism which sets off the attack in the individual animal—recent calving and high milk production being commonest —our knowledge, though still incomplete, shows that it can be efficiently controlled by the feeding of calcined magnesite at the appropriate danger periods of the year, and that possible recurrence of the attacks in affected animals can be so controlled.

There are indications, too, that the feeding of hay

in adequate amounts in winter is of help as a further safeguard. On the other hand, as already mentioned, the heavy application of nitrogen to grassland shortly before grazing is associated with a high incidence of the disease. Heavy feeding of low quality silages, with little or no hay, likewise appears to favour its incidence. Sudden changes to succulents, particularly when fed to excess in the winter, is also a factor to be considered.

The factors of management to note in the light of our knowledge to be the avoidance of nitrogen fertilisers on grazing land in the spring within a month of grazing—particularly in lush seasons—the feeding of good quality hay as part of the maintenance ration, and the feeding of a specific supplement of magnesium at the appropriate time of flush of grass, or prior to expected change to succulents on winter keep.

As the grass season is further increased, and greater use is made of forage crops, the story of hypomagnesaemia will tend to change from the new practices introduced in feeding and management. Its association with ketosis, of which it is often the forerunner, is well recognised clinically, particularly when it occurs as part of the symptoms of milk fever in the freshly calved cow. A close watch on the type of milk fever cases being experienced can give useful indication of a possible hypomagnesaemic tendency in the herd.

Other Grassland Conditions

Other conditions that occur on grassland, or on forage crops grown as a complement to modern grass production, include allergic bloat, urticaria, " brown nose," " frothy bloat," " kale bloat," fog fever (generally agreed to be associated with husk or lungworm), rye grass staggers, rape poisoning, haematuria associated with excessive kale feeding, and a high degree of infertility. This is associated also with heavy kale feeding and seems to occur, at least in Hampshire, with a general lowering of nutritional standards from other management factors. In certain seasons, however, a goitrogenic factor exists in young kale and can have disastrous effects on pregnant ewes and their subsequent production of lambs.

The relationship between management, and the occurrence of such conditions as parasitic gastro-enteritis and husk, pregnancy toxaemia of ewes (twin lamb disease), entero-toxaemia on leys and forage crops in sheep and lambs, eversion of the uterus of pregnant ewes, *Nematodirus* worm infection under conditions of modern worm therapy, foot-rot and other problems is now well recognised.

If forage cropping be accepted as a virtual expansion of grassland, then it must be accepted that problems previously associated with grassland expansion are likely to be encountered. Foot troubles are likely to be greatly increased in number. Foul, punctured, and cut feet are of greater frequency on leys compared with old pasture land, due to greater risk of foot damage on the less consolidated land. They are certain, therefore, to be of greater incidence than ever when forage crops are grazed. The incidence is associated not only with the type of soil, but also with the roadway from byre or yard to the forage crop or the silage pit, and with the " run back " if one is used.

A condition not infrequently seen on heavy land, when forage crops are grazed, is one akin to mud fever in the horse, in which there is a virtual loss of the hair and the superficial layers of the skin on the legs. This, in the cow, is often associated with an inflammatory condition extending up the legs, occasionally sufficient to produce soreness, or even a slough between the leg and the udder.

It may be asked why should risks of modern production be taken? They are tied up with the need to maintain and improve present production, and with the sure knowledge that imported foods, even if they do not become dearer, are likely to be in shorter supply in the future.

There can be no doubt that production on the traditional pre-war basis, with the feeding of hay for maintenance, and imported foods for production—as expounded by James MacIntosh and publicised by Robert Boutflour—is the surest and safest way of attaining maximum production and probably requires the least skill in application. It cannot, however, be applied generally to-day, and it is most undesirable that it should be.

In order to attain maximum production from grassland and to avoid waste, supplementation at most periods of the year is necessary. This supplementation is not confined to minerals, but includes carbohydrate at times of grass protein excess, as in spring and protein in times of poorer quality autumn growth with fibre an important factor at times of lush growth.

THE HORSE SOCIETY RIDING COMPETITION AND GYMKHANA

The Horse Society of the Royal (Dick) School of Veterinary Studies held its second Riding Competition and Gymkhana in the park of Bush House on Saturday, May 26th. The riding events comprised a dressage test, show-jumping, and the negotiation of a tortuous cross-country course. The College horses numbered eight of the 23 entrants, the remainder coming from riding schools in Edinburgh. Unfortunately the standard of jumping was not as high as had been expected, but the College horses did rather better than last year, coming second, fourth, and eighth! Messrs. Chalmers and Beattie assisted two outside judges in adjudicating the jumping.

The Gymkhana events consisted of obstacle races, bending races, and " musical bricks " which Mr. T. Stewart, the announcer, appeared to arrange admirably.

About 300 spectators were present, including a welcome number of staff from the College. Prizes were presented by Mrs. Mitchell, the Staff Cup for the Best Horseman or Horsewoman being awarded to Miss Jury who also received a replica cup donated by Professor W. M. Mitchell. Mr. G. S. Ferguson was responsible for planning and organising this enjoyable and successful function.

Current Literature

BOOK REVIEW

Veterinary Parasitology. By GEOFFREY LEPAGE. Oliver & Boyd, London. Price 3 gns.

With this book Dr. LePage has made a fine contribution to the literature on veterinary parasitology.

The book opens with two chapters dealing with parasitism, and host-parasite relationships, and with the effect of parasitic animals on their hosts.

The main sections of the book are devoted respectively to the helminth worms, the arthropods, and the protozoa, and in each case there is a detailed zoological description of the various Classes, Orders, and Families, and a description of particular genera and species of importance. The systematic and morphological data are very accurate and clearly set out. In each case there follow sections devoted to the life history, effects on the host and control and treatment measures. These are very fully discussed.

In a book of this kind recommendations for treatment are apt to become very quickly out of date, and the author is to be congratulated on the large amount of really modern information which he has been able to include. He has obviously taken a great deal of trouble in collecting his references on control measures, and he gives at the end of the book a most useful and extensive bibliography covering several hundred references.

The opening sentence of Chapter I commences: "This book is about parasitic animals that cause diseases of British farmstock." The author has obviously tried to keep this principle in view, but it has been quite impossible for him to ignore many of the parasites which are of importance overseas, but which do not occur, or are very rare, in Britain. While emphasis is laid on species occurring in British farmstock, it is unfortunately not always made quite clear that certain species also mentioned do not occur in Britain, or if it is so mentioned the reference is not easy to find.

The author has perhaps not been quite critical enough in his selection of material on control measures from the world literature, and in one or two cases he has missed certain important references. These are, however, relatively small points, and will no doubt be corrected in later editions. It would indeed be surprising if the author had managed to collect together such a wonderful volume of information as this book without bringing in a few small errors.

In naming of insecticides it is as well to adopt a standard, and the author has fallen into the trap of accepting the names given by various authors from whose literature he quotes. It thus happens that the words "Gammexene," "BHC" and "gamma BHC" are rather indiscriminately used, without definition.

There are various ways of writing a text-book of this sort, and from the purely veterinary point of view it might be that the easiest system is to ignore zoological relationships and deal with hosts. This may lead to some repetition, but gives a very clear picture of what may be expected in any particular host. The author of this book has chosen to tackle the subject from the standpoint of zoological relationships, but a good index makes it reasonably easy for the veterinary reader to find his way about.

The illustrations are plentiful, and in general excellent. Some of the photographs are particularly good. The author has, however, made use of a few very old drawings, reproduced from rather ancient text-books, and a few of these have not been reproduced too well.

However, despite the few blemishes this is a very fine book, well produced and printed. It is a mine of most interesting information, and will surely become a standard text-book for veterinary students, not only in this country, but all over the world.

DIGEST

Acetonaemia

The treatments for acetonaemia used in the U.S.A. at present, are the subject of a recent review by Swenson (1956). The purpose of all the treatments covered by this review was to raise the level of the blood sugars. For this purpose the most rapid and direct method is the intravenous injection of sugar, for which glucose, fructose or invert sugars, are widely used at the dosage rate of 0·5 gramme per kg. bodyweight (450 ml. for a 1,000 lb. cow). Unfortunately the lift in the level of the blood sugar achieved by the sugar injection, does not last for more than two hours, although the use of invert sugars can prolong the effect for six hours.

There are a number of treatments to support the sugar injection, which aim to induce the animal to correct its own hypoglycaemia. Those who believe that the basic of acetonaemia is due to impaired ruminal digestion, favour the administration of molasses, cobalt, and vitamin A, which encourage growth of the microflora of the rumen and thereby aids in the production of the vitamin B complex and the digestion of cellulose.

Dosing with sodium acetate, sodium proprionate, sodium lactate, or sodium bicarbonate is believed to counter the hypoglycaemia by suppressing the formation of ketone bodies which interfere with the carbohydrate metabolism.

The administration of ACTH can cause an increase in the blood glucose levels by causing the formation of carbohydrates through the breakdown of the body protein and fats. However, for this reason, ACTH administration is not favoured by Swenson, who suggests that there are the other means of correcting the hypoglycaemia at less expense to the body of the animal, and, incidentally, to the farmer.

Fats and Food

The relationship between fatty acids in the diet, and disease, is the subject of two recent reports.

In its editorial of April 28th, the *Lancet* refers to work in which it was indicated that the ingestion of such foods as butter, eggs and beef dripping, which contains a high proportion of saturated fatty acids, predispose to coronary artery diseases. Conversely, those who favour vegetable and fish oils, in which unsaturated fatty acids predominate, as their staple diet are, apparently, preserved from this group of ailments.

It has been established that patients with infarcts of the myocardium have high levels of B lipoproteins and cholesterol in their plasma. The B lipoproteins interfere with the action of the anti-clotting agent, heparin, and thereby cause the blood to coagulate more easily. The cholesterol is also incriminated as a contributory cause

of coronary thrombosis, because it is present in large quantities in the atheromata of the coronary, and other vessels.

The beef dripping, butter type diet raises the blood level of the B lipoproteins and cholesterol, while the opposite obtains when vegetable and fish oils represent the main diet. If this hypothesis is substantiated, it is possible, but improbable, that our feeding habits and farming practice, could undergo drastic changes.

In contrast to these findings Garton *et al*, in a letter to *Nature* (1956) suggest that the inclusion of unsaturated fatty acids, of which cod liver oil is a potent source, in the food of calves is contra-indicated, as they increase the incidence, and severity, of muscular dystrophy due to vitamin E deficiency. Support for this hypothesis was the finding that it was not possible to produce muscular dystrophy experimentally in calves, when they were given rations low in vitamin E content, but free of fat.

Livestock Census in Scotland

The steady increase since the War in the total numbers of cattle and pigs was continued during the period June, 1953–54, according to the Agricultural Statistics 1954 (Scotland), which has just been published. The total number of all types of cattle in Scotland in June, 1954, was 1,700,000, as opposed to 1,600,000 in June, 1953. The total number of pigs was 552,976, an increase, over 1953, of 82,000.

The sheep total was slightly down at 7,420,000, as against 7,460,000 in 1953. This drop of 40,000 was mainly the result of a good lamb crop in 1952–53, there was actually an increase in the breeding stock during 1953–54. The decline since the War in the numbers of horses used for agricultural purposes was maintained, and the total for 1954 was 45,092, as against 51,186 in 1952, and 117,007 for 1945.

D. W. J.

References

Agricultural Statistics 1954 Scotland.
Editorial. (1956). "Fats and Disease." *Lancet*. **270**. 557.
GARTON, G. A., DUNCAN, W. BLAXTER, R. K., MCGILL, R, SHARMAN, G., & HUTCHESON, M. (1956). *Nature*. **177**. 792–93.
SWENSON, M. J. (1956). *Vet. Med.* **51**. 207–11.

ABSTRACTS

Preliminary Studies in Pseudomonas Mastitis. DEUBLER, M. J., & COLE, E. J. (1955). *Amer. J. Vet. Res.* **16**. 511 – 14.

Mastitis due to organisms belonging to the genus *Pseudomonas* is a problem of increasing importance in the U.S.A. The authors examined 147 strains recovered from milk samples by such characters as morphology, colonial appearance, and pigment production. The majority of the strains showed spreading colonies with a detectable grape-like odour and 118 produced chloroform-soluble pigment.

A blood-serum titre of 1 – 160 or higher was noted in all the cows shedding *Pseudomonas* and this was accompanied by a milk-whey titre of at least 1 – 80.

Of the various antibiotics tested, polymyxin B and chloramphenicol appeared to possess the best inhibitory power against the organism.

S. J. E.

Studies on an Anthrax Vaccine Prepared from Non-capsulated Variants of *Bacillus anthracis*. PERSONEUS, G., *et al.* (1956). *Amer. J. vet. Res.* **17**. 153–6.

The authors state that the virulence of the Pasteur anthrax vaccine tends to vary and that its use may, on occasion, cause death. Vaccines containing saponin possess similar disadvantages. They therefore investigated the possibility of using a type of vaccine, previously prepared in South Africa, which employs a non-capsulated variant of *Bacillus anthracis*.

The immunity produced by the vaccine was first studied in guinea-pigs. Similar studies were attempted in pigs and calves, but these were abandoned because of the difficulty of consistently producing an experimental lethal infection in these species. When the vaccine was used in sheep and goats it was found that they survived 50 and 500 times the recommended dose, while in a protection trial, 25 out of 26 sheep survived an experimental challenge that was fatal to 20 out of 21 unvaccinated controls.

E. A. G.

Distemper Complex in Wild Carnivores Simulating Rabies. HELMBOLDT, C. F., & JUNGHERR, E. L. (1955.) *Amer. J. Vet. Res.* **16**. 463 – 9.

Thirty-five wild carnivores, comprising grey fox, red fox, racoon and skunk, were subjected to pathological examination. Each animal had a history of aggressiveness, depraved appetite or frequenting populated areas.

Histological and biological examination for rabies was negative in each case. Canine distemper was diagnosed in 20 animals on the basis of positive ferret inoculations or the finding of intra-nuclear or intra-cytoplasmic inclusion bodies, which occurred chiefly in the urinary tract. It was believed, on clinical grounds, that some of the remaining 15 animals were also affected with distemper but this diagnosis was not confirmed, either because ferret inoculation was not carried out, or because inclusion bodies were absent.

The authors believe that rabid symptoms may be caused by the distemper complex and recommend that complete histological examination and mouse and ferret inoculations be carried out to exclude rabies.

M. B. H.

POULTRY STOCK IMPROVEMENT PLAN, 1956 REGISTER

The 1956 Register of Accredited poultry breeding stations, Accredited and Approved hatcheries and Standard Bred breeders in England and Wales has now been published. The Register shows the breeds and approximate number of accredited and standard bred stock on each breeding station and is published to assist poultry keepers to obtain good stock.

Copies of the Register may be obtained, post free, on application to the Poultry Branch of the Ministry of Agriculture, Fisheries and Food at Whitehall Place, London, S.W.1, or to the offices of county agricultural executive committees. Members of the Plan will receive copies direct from county poultry advisory officers.

News and Comment

R.C.V.S. DINNER PARTY

On Wednesday, June 6th, 1956, the President of the Royal College of Veterinary Surgeons, Professor L. P. Pugh, M.A., B.SC., F.R.C.V.S., entertained for Dinner at the Hyde Park Hotel, the President of the National Farmers' Union, Sir James Turner, and the Secretary, Mr. Knowles, the Vice-Chairman of the Milk Marketing Board, Mr. Trehane, and Dr. Joseph Edwards, the Secretary of the Royal Agricultural Society of England, Mr. Alec. Hobson, and the Chief Veterinary Officer, Mr. J. N. Ritchie. The Vice-Presidents, Mr. H. Sumner and Professor T. J. Bosworth, the Treasurer, Mr. G. N. Gould, and the Registrar, Mr. W. G. R. Oates, were also present.

LEADING VETERINARIANS IN DENMARK

On Wednesday, May 2nd, a happy gathering of veterinarians took place in Copenhagen. The Danish Veterinary Association entertained to lunch Mr. Charles V. Dayus, Agricultural Adviser to the New Zealand Government and Professor Harold Burrow of the Royal Veterinary College. Amongst those present at the lunch were: Dr. K. Seidel, Chief Veterinary Officer, Copenhagen, and President of the Danish Veterinary Association; Dr. C. Werdelin, Secretary of the Danish Veterinary Association; Dr. N. Plum, Director of the Veterinary Serum Laboratories, Copenhagen; Dr. F. Wöldike Nielsen, Director of Veterinary Services and Chief Veterinary Officer, Denmark; Professor H. C. Bendixen, Professor of Medicine at the Royal Veterinary and Agricultural College, Copenhagen.

THE BRITISH VETERINARY POULTRY ASSOCIATION

The inaugural meeting of the above Association which was held at the Ministry of Agriculture Veterinary Laboratory, Weybridge, on May 30th, through the courtesy of the Director, Dr. Stableforth, attracted an attendance of over 30 members.

The meeting approved, with certain amendments, the constitution drawn up by the provisional committee, and appointed the following officers: Chairman, Dr. R. F. Gordon; Vice-Chairman, Mr. N. Dobson; Secretary, Mr. J. E. Wilson; Treasurer, Dr. A. Buxton; Committee, Dr. N. Barron, Dr. W. P. Blount, Mr. R. H. Axworthy.

The meeting was addressed by Dr. Kendal on work carried out at Weybridge by Mr. Asplin on duck virus hepatitis and other diseases of the duck. Visits were made to sections of the parasitology and virus departments, and to the new library. The next meeting will be held at Olympia, London, at the time of the Poultry Show. Full details of this meeting will be announced later.

IN PARLIAMENT

Export of Horses

CAPTAIN KERBY (June 8th) asked the Minister of Agriculture, Fisheries and Food whether, in view of the conditions attendant on the re-export of live horses to the Continent from Eire for the horse-meat trade, he will make it illegal for horses to be exported to Eire in order to be re-exported alive to the Continent; and if he will make it a condition of all live horse exports to Eire that the consignee is subject to an export licence and gives a guarantee that such horses will not be sold for slaughter in Europe and that any breaking of such a guarantee will be punishable by fines and cancellation of the offender's export licence.

MR. AMORY: I have had no evidence of any traffic in horses from this country to the Irish Republic for re-export to the Continent for slaughter. Horses valued at less than £100 cannot be exported to the Irish Republic without a Board of Trade export licence, and I do not think there is any need for the further measures suggested by my hon. and gallant Friend. However, if he is aware of any trade of this nature and sends me particulars, I will certainly look into the matter, in consultations with my right hon. Friend the President of the Board of Trade.

SOUTH AFRICAN VETERINARY MEDICAL ASSOCIATION GOLDEN JUBILEE CONGRESS

The Golden Jubilee Congress was held at the Veterinary Laboratories, Onderstepoort, from August 29th to September 2nd, 1955, and coincided with the Golden Jubilee celebrations of the City of Pretoria. The organising committee succeeded beyond expectation in making this Congress an exceptional one; more time was given for the presentation of papers and demonstrations, more distinguished visitors and guests attended and more social functions were provided.

There were 177 members and 18 guests present from the Union, S. Rhodesia, Britain, Israel, Portuguese East Africa and Brazil. Mr. G. S. Ferguson of Edinburgh represented the British Veterinary Association.

The Congress was opened by the Prime Minister of the Union, the Hon. J. G. Strydom.

The papers read and the demonstrations given were on the following subjects:—

" The Rôle of the Veterinarian in Animal and Public Health "; " Breeding Disorders in Domestic Animals "; " Recent Advances in Animal Nutrition," and " The Tuberculosis Problem."

There were also clinical papers and demonstrations and a paper on " Insect Vectors and Virus Diseases."

All the papers will be published in the Journal of the South African Veterinary Medical Association.

One of the resolutions carried unanimously was:—

" The Golden Jubilee Congress of the South African Veterinary Medical Association of South Africa affirms its belief in the essential unity of all veterinary endeavour. In furtherance of this belief and in order to facilitate the maximum use of the veterinary potential to the advantage of our country, Council is requested to investigate the feasibility of and to take further steps concerning the integration of private practitioners and, in certain cases, municipal veterinarians in the State service on a part-time basis."

Dr. R. A. Alexander, Director of Veterinary Services, was made an Honorary Life Vice-President

of the Association in recognition of his signal services to the profession.

The office bearers for 1955-56 are: President, A. M. Diesel; Vice-President, P. S. Snyman; Hon. Secretary, K. E. Weiss; Hon. Treasurer, G. D. Sutton; Editor, E. M. Robinson; Members, R. A. Alexander, R. Clark, L. W. van der Heever, C. F. B. Hofmeyr, M. de Lange, S. W. J. van Rensburg, A. D. Thomas, and R. du Toit.

The Congress was closed by a very well-attended dinner which was held at the Pretoria Country Club.

R.A.V.C. GOLFING SOCIETY, 1956

The 25th annual general meeting of the R.A.V.C. Golfing Society was held at the North Hants Golf Club, Fleet, on Thursday, June 7th, 1956, and Major Denys Darby presided, in his capacity as Vice-President, in the absence of the President, Lieut.-Col. J. Bell.

The meeting was held in showery weather; the morning was wet, but it became warm and sunny in the afternoon. It was generally agreed that the clash with Derby Week affected the attendance, but the prize winners included Captain G. S. Walker (R.A.V.C. Challenge Cup and Prize, and the Captain's Prize); Major Denys Darby (Founders' Cup and Prize, and the Club Prize), and Lieut-Col. D. A. Green (Conder Cup and Prize).

The following members are the office bearers for the year 1956-57:—*President*, Lieut-Col. J. Bell; *Vice-President*, Major Denys Darby; *Captain*, Captain Alexander; *Committee*, Brigadier J. J. Kane, Lieut-Col. W. Rouse and Lieut.-Col. J. Hegarty; *Hon. Secretary and Treasurer*, Major J. H. Wilkins.

Next year the meeting will be held at the North Hants Golf Club on the day before the R.A.V.C. Officers' Club Dinner.

CAMELS IN TUSCANY

A plan is on foot to revive, after 13 years, the herd of camels which for generations flourished on the royal estate of San Rossore, which is bounded on the south by the river Arno and on the west by the sea. Two young dromedaries, purchased on behalf of the Tourist Organisation of Pisa, in Tunis, for a price quoted as 400,000 lire (approximately £2,200) will now be established in the quarters previously occupied by generations of their species. The origin of the herds dates back nearly 300 years.

It is related, though no reliable records exist, that the first dromedary, coming from Tunis, was introduced into Tuscany in 1620. More followed in 1662, and yet more in 1663, these latter having been imported by the Grand Duke Ferdinando II, taken in battle from the Turks. On one occasion there was a spectacular arrival at the port of Leghorn of 300.

The Grand Duke, having imported the camels on reports of their capacity for labour, distributed them at first among the various grand-ducal estates, but it proved that only at San Rossore did they thrive and multiply. More were imported during the 18th century and subsequently they were all established at San Rossore and systematic attention was given to the herd.

There in the mild sea air the camels prospered and multiplied, so that in 1785 there were already 134, and by 1789 the herd had increased to 196.

In subsequent years the numbers diminished, and in 1921, according to data then supplied by the administrator of the royal estate, only 49 survived. Before the last World War the number is reported as around 60, but under the German occupation of San Rossore in 1943 the camels were pursued into the woods, slaughtered, roasted, and eaten.

PARASITIC GASTRITIS IN YOUNG CATTLE IN IRELAND

Veterinary Officers of the Department of Agriculture, Ireland, have been investigating the deaths of young cattle which seem to be due to a heavy infestation of internal parasites. This disease, which is closely associated with poor condition in cattle, has occurred in several parts of the country.

HOLIDAY EXCHANGE

The following children of continental veterinary surgeons are still hoping for exchange holidays, etc., with the children of British veterinary surgeons. We have been able to make arrangements for quite a number to date, but interested readers are still invited to write to the General Secretary for fuller particulars.

Austria

Exchange

14-year-old boy—Pressbaum (Austria).

France

Exchanges

14-year-old boy—Montaigu (Vendée). Summer, 1956.

14-year-old boy—Champdeniers (Deux-Sèvres). Summer, 1956.

15-year-old boy—Avranches (Manche). Summer, 1956.

14-year-old boy—Neuvy-le-Roi (Indre-et-Loire). Summer, 1956.

13-year-old boy—St. Aubin d'Aubigné. Summer, 1956.

15-year-old girl—Pacy-sur-Eure.

Au pair

17-year-old boy, would like to stay in Britain for 10 months but invite an English boy in exchange if desired. He could help British veterinary surgeon in practice, drives car, etc.

Germany

Exchanges

16-year-old boy—Grebendorf-Eschwege (Hessen).

18- and 16-year-old boys (brothers)—Fleckeby (Schleswig-Holstein).

18-year-old boy—Bochum (Westphalia).

Italy

Exchange

14-year-old boy—Florence, Italy.

DOCTORATE FOR TIMOTHY D. GLOVER

The University of Cambridge has conferred the degree of Doctor of Philosophy on Timothy D. Glover, M.A., B.SC., M.R.C.V.S., of Downing College. The title of the dissertation was "Some Factors Influencing the Formation and Composition of Semen."

HONOUR FOR EDINBURGH PHOTOGRAPHER

Mr. R. C. W. S. Hood of The Royal (Dick) School of Veterinary Studies, Edinburgh, has been awarded the Fellowship of the Institute of British Photographers.

This award is made only on evidence of distinguished ability. Only 162 Fellowships have been awarded to members of the Institute in the whole of the British Isles and the Commonwealth, and Mr. Hood is the first to gain this distinction in "Photography in Veterinary Science."

THE REGISTER OF VETERINARY SURGEONS

The name of Mr. Joseph Patrick Fitzgerald, of 18, St. Annes Road East, St. Annes-on-Sea, Lancs., has been removed from the Register with effect from May 28th, 1956.

The following members have been restored to the Register with effect from the dates shown:—

Mr. Schalk Willem de Villiers, P.O. Box 85, de Aar, C.P., South Africa (June 11th, 1956).

Mr. Douglas David Morton, Lemoendoorn, Viljoenskroon, O.F.S., South Africa (May 28th, 1956).

FUNERAL OF MISS MARJORIE V. LEVIE

Many members of the profession will be saddened to hear of the death of Miss Marjorie Levie in her 46th year. A graduate of the London College, she joined the staff of the University of Bristol in July, 1952, as a Lecturer in Veterinary Surgery, and her talents, enthusiasm and skill, endeared her to staff and student alike.

An indication of the respect in which she was held was evidenced by the representative gathering and floral tributes at the funeral service which was held at the Bristol Crematorium on Monday, June 4th, at 2.15 p.m. Among those present were:—

Professor Ottaway (University of Bristol staff), Mr. Nunneley (School of Veterinary Science students), Mr. Cameron (B.V.A. Council), Col. Tennant (Mid-West Veterinary Association), Mr. Bovett (Western Counties Veterinary Association), Mr. Maffey (Veterinary Investigation Officers), Miss Phillips (Society of Women Veterinary Surgeons), Mrs. Raymond (Bristol Dogs' Home), Miss Gough (Bristol & District Terrier Club), and Messrs. McCready and Cox, R.S.P.C.A. Inspectors; also the following members of the University or the profession:—

Mr. Allcock, Dr. Ashford, Mr. Chivers, Miss Cooper, Dr. Fitzpatrick, Col. and Mrs. Lewis-Bowen, Dr. Linton, Mr. McCrea, Mrs. Messervy (representing Professor Messervy), Mr. Parker, Mr. Pearson, Mr. V. E. Perry, Mr. Scott, Dr. Smith.

C. W. O.

Marjorie Levie's many friends will be distressed to hear of her death, which was reported in the last issue of THE VETERINARY RECORD.

Marjorie, after qualifying in London in 1933, went immediately into general practice and remained throughout her career essentially a clinician, relinquishing a busy practice in Bristol in 1952 to join the staff of the Department of Veterinary Surgery at Langford. Here she did much of the pioneer work associated with the development of a clinical department and received the first service B.V.Sc. given by Bristol University in October, 1955. Although very ill at the time, Marjorie attended the graduation ceremony which was to be her last important engagement.

By her cheerfulness during this long illness she has set an example of courage which will be difficult to surpass. Our deepest sympathies are extended to her mother and aunt who have nursed her throughout this long period.

We, her colleagues at Langford, have lost a good friend.

A. M.

Mrs. Betty S. Sugden writes:—

By the death of Marjorie V. Levie, the profession has lost one of its outstanding members. Those of us who were fortunate enough to know Marjorie could not but admire her intense interest in every branch of veterinary surgery.

There must be many of us who have benefited from her sincerity and kindness. Marjorie was always willing to give a helping hand and her grand sense of humour was always to the fore.

She bore her long and painful illness with great courage and fortitude—we are proud to have been numbered amongst her friends.

TENKU ABU BAKAR OF JOHORE

Mr. W. E. Lancaster writes from Malaya:—

The news of the death of H. H. Tenku Abu Bakar of Johore (Tengku Aris Bendahara) on May 1st came as a shock to his many friends and acquaintances of different nationalities in Malaya and England, as his previous brief illness had been known to few outside his own family circle.

As reported in our issue of June 2nd, Tenku Abu Bakar, known familiarly as "Bu" to his friends, was the second son of H.H. Sir Ibrahim ibni Almarhum Sultan Abu Bakar of Johore, the present Sultan. "Bu" was sent to England at an early age to complete his schooling, after which he entered the Royal Veterinary College, London. He qualified in December 1919 at the age of 21, and was the first Malay ever to become a Member of the Royal College of Veterinary Surgeons. Early the following year he returned to his native State of Johore where he was appointed its first State Veterinary Surgeon. During his tenancy he built up an efficient veterinary service in his State which is a credit to the enthusiasm he brought to his task. He was particularly interested in animal husbandry, and was responsible for starting as a State project shortly before the Japanese war began what has since become the Federation of

Malaya Central Animal Husbandry Station at Kluang. As a young man he was a lieutenant in the Johore Volunteer Forces and for a time he also acted as Deputy Prime Minister of Johore.

He managed to leave Malaya with his wife and family just before the Japanese occupied Singapore in February, 1942, and found refuge in India. Later he went on to England where his advice was sought on how best the livestock of Malaya, which had been sadly depleted as a result of the Japanese occupation, might be restored to its pre-war state. He was commissioned as a Major in the Civil Affairs Service (Malaya) and was among the first of the liberating British forces to arrive in the country after the Japanese surrender in August, 1945. A man of resourcefulness and with a knack of getting things done, he was made Chairman of the Town Board, Kuala Lumpur, and given the job of rehabilitating and cleansing the town, a task which he accomplished vigorously and speedily.

When the Civil Government was resumed in April, 1946, Tenku Abu Bakar was appointed Chief Animal Husbandry Officer in the Veterinary Department, a post which he occupied until he retired in November, 1952, with 33 years' veterinary service to his credit, to live in London. As Chief Animal Husbandry Officer "Bu" gave most of his attention to the restoration and expansion of the Central Animal Husbandry Station, and this Government farm will always remain a memorial to him.

"Bu" was a man of decided views. Generous, possessed of a ready wit and descriptive vocabulary, widely travelled and with a fund of local stories and experiences on which to draw, he was always a fount of entertainment at any social gathering. As a young man he was a very competent horseman and a polo player of considerable ability, and his interest in racing was maintained even when his own riding days were over. By his death, at the early age of 58, Malaya has lost one of her best-known characters, and England one of her best friends.

Our deepest sympathies are extended to his wife, Tenku Fatimah of Johore, and his family in their sad loss.

MR. W. J. P. KING

D. B. writes:—

The death of Bill King will be felt, not only by his immediate colleagues, but by other members of the profession whose good fortune it was to have come into contact with him.

A man of great ability and many talents, his experience was unstintingly at the disposal of all who sought it. A guide to the new graduate, a friend to the stranger within the gates, he was a most lovable and entertaining colleague.

PERSONAL

Births

BLAMPIED.—On June 10th, 1956, to Heather, wife of Pierre Blampied, M.R.C.V.S., of Bon Air, Queen's Road, Guernsey, Channel Islands, a son, Nicholas Pierre.

DONALDSON.—On May 22nd, 1956, at Wanganui, New Zealand, to Dora, wife of D. W. Donaldson, M.R.C.V.S., a daughter, Judyth Mary, a sister for Stephen and David.

GREIG.—On May 30th, 1956, to Margaret (*née* Cooper, M.R.C.V.S.), wife of Dr. Alastair Greig, B.SC., M.R.C.V.S., Bearsden, Glasgow, a daughter, Fiona Jean.

MURRAY.—On June 10th, 1956, at Townlands Hospital, Henley-on-Thames, to Monica, wife of Hugh P. Murray, M.R.C.V.S., of Grenfell Road, Maidenhead, Berks, a sister for Rupert and Gillian.

R.C.V.S. OBITUARY

We record with regret the deaths of the following members of the profession:—

HESKETH, Harry Kenneth, District V.O., P.O. Box 46, Umtali, Southern Rhodesia. Graduated Edinburgh, July 16th, 1924; died February 29th, 1956.

Mr. Hesketh was appointed Government Veterinary Officer in the Southern Rhodesia Veterinary Department in 1926. He had a wide knowledge of all the various aspects of his professional work, but his greatest interest was in tuberculosis. He was responsible for the eradication of tuberculosis scheme which was inaugurated at Umtali, and the present extremely low incidence of the disease in this district is evidence of his keenness and ability.

His sense of humour, kindness and understanding endeared him to all his colleagues, and to his widow and his sons we extend our deepest sympathy.

KENDRICK, William (Capt. late R.A.V.C. (S.R.)), of Tarvin, Chester. Graduated London, July 10th, 1913; died June 8th, 1956.

COMING EVENTS

June

20th (Wed.). Meeting of the Midland Counties Division, B.V.A., at the Raven Hotel, Droitwich, 2.30 p.m.

Summer Meeting of the Lancashire Division, B.V.A., at the Chester Zoo, Upton, Chester, 2.30 p.m.

21st (Thurs.). Summer outing of the Herts and Beds Division, B.V.A., at Woburn Park, 2.30 p.m.

22nd (Fri.). Annual General Meeting of the Lincolnshire and District Division, B.V.A., at the George Hotel, Grantham, 2.15 p.m.

10th Ordinary Meeting of the Southern Region of the Association of Veterinary Teachers and Research workers at the School of Veterinary Medicine, Cambridge University, 11 a.m.

Meeting of the South Wales Division, B.V.A., at the Cambrian Hotel, Saundersfoot, 2.30 p.m.

28th (Thurs.). Meeting of the Lakeland Division, B.V.A., at The Hydro, Windermere, 6 p.m.

July

28th (Sat.). Annual reunion of the R.V.C. '52 Club at Ye Miller of Mansfield, Goring.

September

16th to 22nd (Sun. to Sat.). 74th B.V.A. Annual Congress at Royal Leamington Spa.

R.C.V.S. EXAMINATIONS

June 21st, Thursday, and June 22nd, Friday. M.R.C.V.S. Written Examinations.

June 25th, Monday. M.R.C.V.S. Practical and Orals commence (Panels " A " and " B ").

BRITISH VETERINARY ASSOCIATION QUARTERLY MEETINGS

Wednesday, July 11th, 1956—No. 7, Mansfield Street

10.30 a.m.—Organising Committee.

2.00 p.m.—Home Appointments Committee.

3.30 p.m.—Parliamentary and Public Relations Committee.

Thursday, July 12th, 1956—No. 7, Mansfield Street

10.00 a.m.—Veterinary State Medicine Committee.

12.30 p.m.—Finance Sub-committee.

2.15 p.m.—General Purposes and Finance Committee.

Friday, July 13th, 1956—Connaught Rooms

10.30 a.m.—Council Meeting.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Lanark. South Dyke, Allanton, Shotts (June 2); Hill of Chryston Farm, Chryston, Glasgow (June 6).

Lincs. New House Farm, Hospital Drove, Long Sutton, Spalding (June 7).

Suffolk. High House Farm, Cransford, Woodbridge (June 2).

Yorks. Cote House, Lunedale, Middleton-in-Teesdale (June 2); Cliffhouse Farm, Kilnsea (June 5).

Atrophic Rhinitis

Salop. Burnt House Farm, Richards Castle, Ludlow (June 7).

Fowl Pest

Herts. Belsize Poultry Farm, Holly Hedges Lane, Sarratt, Rickmansworth (June 5).

Lancs. Fair View, Wrennalls Lane, Eccleston, Chorley (June 5).

Middx. Queensborough House, Ferry Lane, Hythe End, Staines (June 5).

Sussex. Little Buckswood Farm, Crawley (June 7).

Swine Fever

Essex. Parkside, Fort William Road, Vange, Pitsea, Basildon (June 6); Chapel Farm, Chapel Lane, Boxted, Colchester (June 8).

Hants. The Bungalow, Pitmore, Sway, Lymington (June 8).

Northumberland. Prospect Cottage, Medburn, Ponteland, Newcastle-on-Tyne (June 5).

Stirling. Brightons, Falkirk (June 7).

Sussex. Godsmark Farm, Chapel Lane, Boxted, Colchester (June 8).

Warwicks. Lapworth Lodge Farm, Lapworth (June 6); 437, Kingstanding Road, Erdington, Birmingham (June 8).

Worcs. Owl Hill Farm, Dunhampton, Stourport-on-Severn (June 5).

Yorks. Weel Road, Hull Bridge, Tickton, Beverley; Park Lodge Farm, Malham Road, Eastmoor, Wakefield (June 5).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

Talking Point

Sir,—With reference to Mr. Cox's letter to THE VETERINARY RECORD on June 2nd, I know of no single factor that affects the prestige of the profession so much as the wide divergence in values of identical services rendered to animal owners. This, indeed, is a subject which calls for immediate collective action.

It is high time too that we introduced certain progressive ideas into our affairs, such as having an animal welfare clinic of our own in each city, sponsored by the B.V.A. with the blessing of the Royal College of Veterinary Surgeons. We cannot ignore the fact that these clinics have an increasing appeal to the public.

Yours faithfully,
PANDE H. NARAYANA.

243, Smithdown Lane,
Liverpool, 7.

June 4th, 1956.

Ringworm and its Treatment

Sir,—We are greatly concerned at the increased number of cases of ringworm seen over the past few months in cats, and to a smaller extent in dogs. We should be interested to know whether other members of the profession are having the same experience and we should be grateful for any suggestions concerning effective treatment.

Yours faithfully,
RUTH McLELLAND,
W. M. TAYLOR.

15, Glendower Place,
South Kensington,
London, S.W.7.

June 6th, 1956.